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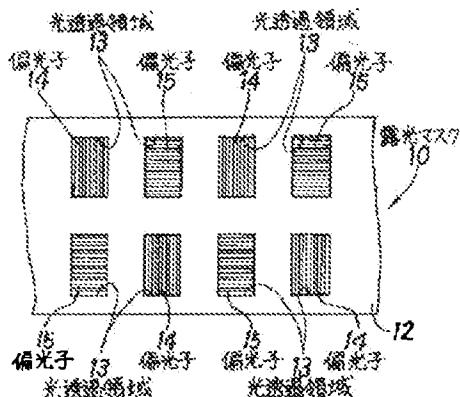
(54) EXPOSING MASK

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(57) Abstract:

PURPOSE: To provide the exposing mask which can form sharp resist pattern and has the high accuracy of pattern transfer and resolution.

CONSTITUTION: A chromium film 12 as a light shielding film is patterned on a mask substrate and light transmission regions 13 which are the apertures provided in this chromium film 12 are arranged in a matrix form. Polarizers 14, 15 which intersect orthogonally with each other in the polarization direction of the linearly polarized light to be passed are alternately provided in the light transmission regions 13 adjacent to each other. Onto of the light beams emitted from a light source, the light beams transmitted through the polarizers 14 and the light transmitted through the polarizers 15 are, therefore, linearly polarized light beams which intersect orthogonally with each other in the polarization direction without interfering with each other. Then, the intensity distribution on the image plane of the light beams transmitted through the polarizers 14, 15 has no maximal parts exclusive intrinsic peaks of the patterns.



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**CLAIMS**

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**[Claim(s)]**

[Claim 1] An exposure mask in which light polarizer with which a polarization direction of linear polarization made to penetrate lies at right angles mutually is formed in said light transmission area which adjoins mutually in an exposure mask in which a light transmission area is arranged by matrix form.

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[Translation done.]

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## DETAILED DESCRIPTION

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### [Detailed Description of the Invention]

#### [0001]

[Industrial Application] This invention relates to the exposure mask used in the lithography technology for manufacturing a semiconductor device.

#### [0002]

[Description of the Prior Art] As an exposure mask used in a lithography technology, The field which formed the pattern in mask substrates, such as a glass substrate, by the chromium film, and formed the chromium film is made into a shielding region, and the usual mask which made the field which does not form the chromium film the light transmission area, the mask in which the phase shifter was formed on such a usual mask, etc. are known from the former.

#### [0003]

[Problem(s) to be Solved by the Invention] However, since a coherent light emitted from the same light source in the lithography technology is usually used, the transmitted lights interfere in any above conventional exposure masks. For this reason, a sharp resist pattern could not be formed and pattern transfer accuracy and resolution were not necessarily high.

#### [0004]

[Means for Solving the Problem] In the exposure masks 10 and 20 by this invention, the light polarizers 14 and 15 with which a polarization direction of linear polarization made to penetrate lies at right angles mutually are formed in the light transmission area 13 which adjoins mutually.

#### [0005]

[Function] In the exposure masks 10 and 20 by this invention, since the polarization direction of the light 17 which penetrated the light transmission area 13 which adjoins mutually lies at right angles mutually, these transmitted light 17 comrades cannot interfere, but a sharp resist pattern can be formed.

#### [0006]

[Example]Hereafter, the 1st and 2nd examples of this invention are described, referring to drawing 1 - 4.

[0007]Drawing 1 - 3 show the 1st example. In the exposure mask 10 of this 1st example, as shown in drawing 1 and 2, the chromium film 12 as a light-shielding film is patterned after the mask substrate 11 which is a glass substrate etc., and the light transmission area 13 which is the opening provided in this chromium film 12 is arranged by matrix form.

[0008]The light polarizers 14 and 15 with which the polarization direction of the linear polarization made to penetrate lies at right angles mutually are formed in the light transmission area 13 which adjoins mutually by turns. For this reason, among the lights 17 ejected from the light source 16, the light 17 which penetrated the light polarizer 14, and the light 17 which penetrated the light polarizer 15 are the linear polarization which lies at right angles mutually, and a polarization direction does not interfere each other in it.

[0009]Therefore, the intensity distribution on the image surface 18 of the light 17 which penetrated the light polarizers 14 and 15 does not have voluminousness very much other than the peak of an original pattern, as shown in drawing 3. On the other hand, when the light polarizers 14 and 15 are not formed, optical 17 comrades which penetrated the light transmission area 13 which adjoins mutually interfere each other, and voluminousness may appear very much in the central point P between light intensity distribution.

[0010]As a result, if resist (not shown) is exposed using the exposure mask 10 of the 1st above example, this resist can be patterned sharply. Therefore, the pattern of the chromium film 12 currently formed in the exposure mask 10 is transferred by resist with high degree of accuracy, and is high-resolution.

[0011]Drawing 4 shows the 2nd example. The light polarizers 14 and 15 also of the exposure mask 20 of this 2nd example with which the polarization direction of the linear polarization made to penetrate lies at right angles mutually are the same as that of the 1st above-mentioned example at the point provided in the mask substrate 11 by turns.

[0012]However, the light polarizer 14 and 15 comrades are overlapped in the field in which the chromium film 12 as a light-shielding film is not formed in the mask substrate 11, instead the chromium film 12 is formed in the 1st example in this 2nd example.

[0013]Only the light which the light polarizer 14 and 15 comrades were overlapped and entered only into either of the light polarizers 14 and 15 in the field in such 2nd example can penetrate such light polarizers 14 and 15, The light which entered into the field which the light polarizer 14 and 15 comrades superimpose cannot penetrate such light polarizers 14 and 15.

[0014]Therefore, the overlap area of the light polarizer 14 and 15 comrades is a shielding region, and what is necessary is to pattern only such light polarizers 14 and 15 after the mask substrate 11, and it is not necessary to pattern the chromium film 12 as a light-shielding film after it like the 1st above-mentioned example in this 2nd example.

[0015]For this reason, the creation flow of the exposure mask 20 is simplified. And since the overlap area of the light polarizer 14 and 15 comrades turns into a shielding region as it

is, two kinds of light polarizers 14 and 15 can be arranged in self align to a shielding region.

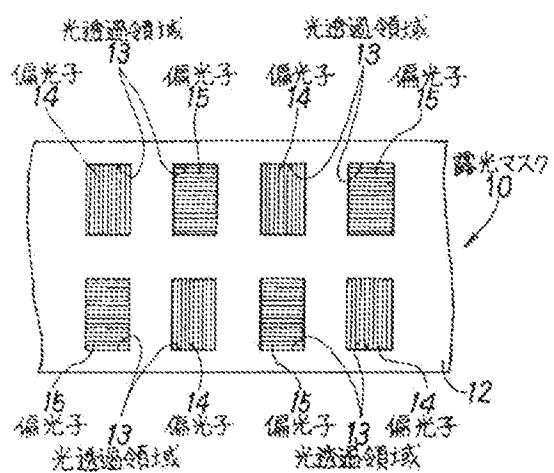
[0016]

[Effect of the Invention] Since the lights which penetrated the light transmission area which adjoins mutually in the exposure mask by this invention cannot interfere but a sharp resist pattern can be formed, pattern transfer accuracy and resolution are high.

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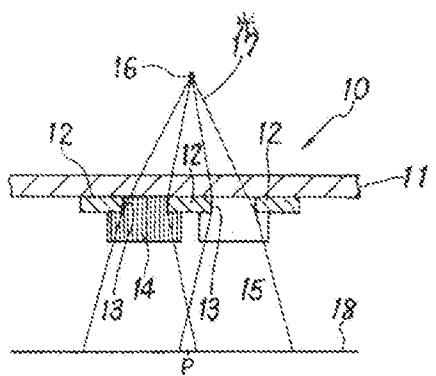
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## Drawing selection Drawing



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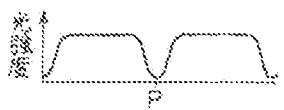
Drawing selection Drawing 2



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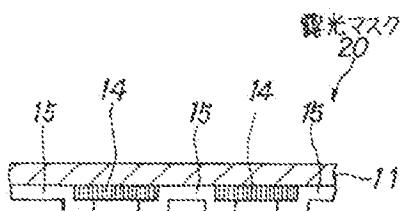
Drawing selection Drawing 3

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[Translation done.]

Drawing selection Drawing 4



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